Nikon

AUTO Ref-Keratometer NRK-8000

Repair Manual

Nikon

NIKON CORPORATION

TOKYO, JAPAN

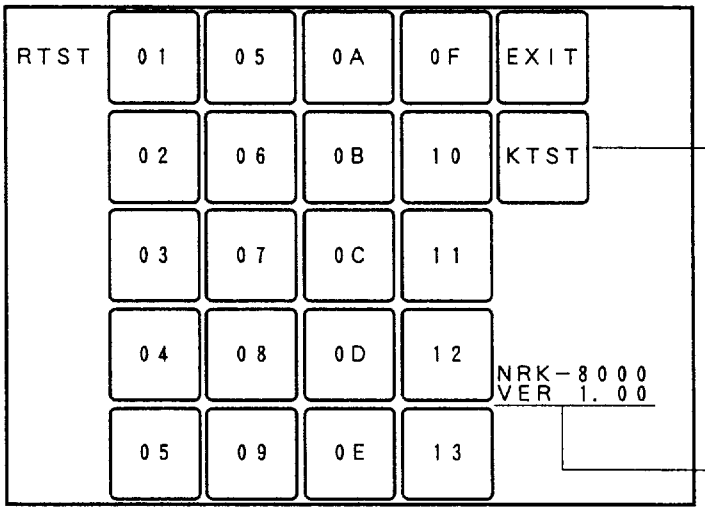
〔6〕 TEST PROGRAM

1 . Entering the Test Program Mode

① After turning on the Main switch, press the [PRINT] key while the sound "do, mi, so, do" is being heard.

② After you hear the sound "do, mi, so, do, do, so, mi, do" followed by three beeps, press the measurement button three times in succession.

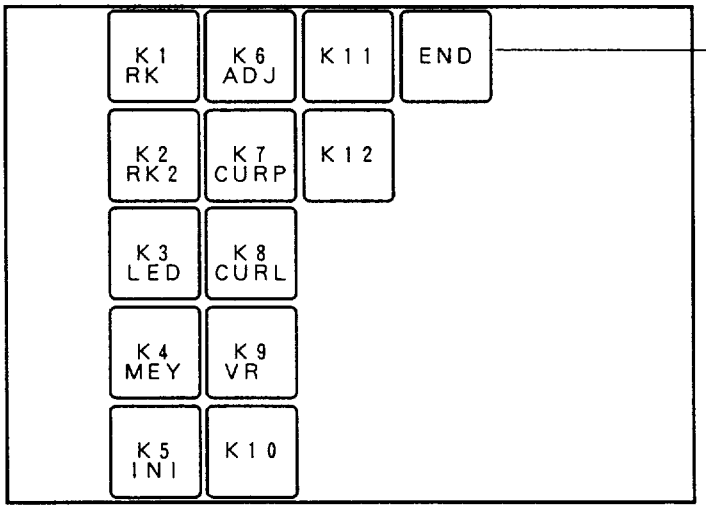
③ The NRK - 8000 will enter the test program mode and display the refractometer (REF) test program select menu screen. (The NRK - 8000 will display the ordinary measurement mode screen if you do not press the key at the proper time.)



2 . Switching between the refractometer and keratometer Test Modes

①Switching into the keratometer test mode

To switch from refractometer to the keratometer test mode, press the [KTST] key in the refractometer test program select screen. The NRK - 8000 will then display the keratometer test program select menu screen and enter the keratometer test mode.



② Switching into the refractometer test mode

To switch from keratometer to the refractometer test mode, press the [END] key in the keratometer test program select screen. The NRK - 8000 will then display the refractometer test program select menu screen and enter the refractometer test mode.

3 . Exiting the test mode

Press the [EXIT] key in the refractometer test mode select screen, and the NRK - 8000 will exit the test mode and enter the measurement mode with the ordinary measurement mode screen.

4 . Refractometer Test Items

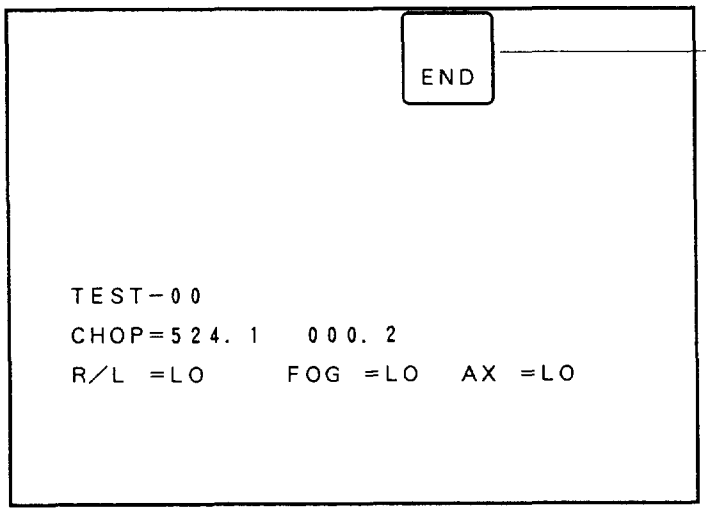
TESTNo.	Description	Remarks	Adjustment
0 0	Check chopper frequency and R/L. FOG and AX sensors.	CHOP=524 ±1.0 Light occlusion = LO	
0 1	Turn on M. LED. Rotate IRM.	MLED ON: M. LED lights up continuously. IRM ROT: Rotates continuously.	
0 2	Not used.		
0 3	Adjust alignment mark.	TOT=83: Dust-proof glass is installed. TOT=94: Dust-proof glass is not	VR3 GAIN
0 4	Turn on C. LED. Turn on M. LED.	CLED ON: C. LED lights up continuously. MLED ON: M. LED lights up continuously.	
0 5	Not used.		
0 6	Measure count offset value. Measure CHA-FIL. CHB-FIL peak values.	PHASE COUNT OFFSET=-200～+200 CHA=CHB=150 ～200 0 V=000	
0 7	Not used.		
0 8	Check monitor background color.	Measurement switch	
0 9	Test printer operation.	[PRINT] key	
0 A	Adjust automatic fogging target position.	+: PRINT switch -: Joy stick(measurement button)	
0 B	Adjust key display position.		
0 C	Making of model eye count table.	Use the model eye set (-26D~ +26D).	
0 D	Adjust alignment offset.	Set to T = R± 3. Set to X = R± 3. Set to Y = R± 3. R＝1 2 6～1 3 5 A＝B＝1 5 0～2 0 0 0＝0 0 0	VR6 TOT VR5 XAL VR4 YAL VR7 CAL
0 E	Check a measurement system.	[X] [Y] = 50 when checking [X] [Y] = 30 when adjusting	
0 F	Initialize memory.	When EEPROM is replaced.	
1 0	Check touch panel switches.	Verify that the switches can be turned on and off normally.	
1 1	Adjust cylindrical axis offset.	Use J38056 cylindrical model eye.	
1 2	Check IC card reader/writer.	Valid only when an IC card reader/writer is built-in.	
1 3	Selection model eye mode and human eye mode.	HUMN EYE = Human eye MODL EYE = Model eye +1.00～－1.00 Dpt.	

5 . Keratometer Test Items

TESTNo.	Description	Remarks	Adjustment
K 1 RK	Adjust refractometer and keratometer alignment offset.	Use measurement button to switch between refractometer and keratometer modes.	
K 2 RK2	Auxiliary refractometer and keratometer alignment adjustment.	Use [PRINT] button to switch between refractometer and keratometer modes.	
K 3 LED	Adjust intensity of keratometer measurement LED light.	MAX MIN K 1 = F F 1 * K 2 = F F 1 * K 3 = F F 1 * K 4 = F F 1 *	VR5 ADGAIN VR6 ADBIAS
K 4 MEY	Making of keratometer model eye count table.	Use J38074 auto-keratometer model eye set.	
K 5	Clear keratometer correction	When EEPROM was exchanged.	
K 6 ADJ	Temporarily adjust keratometer board potentiometer.	Use oscilloscope when replacing keratometer board.	VR5, VR6, VR8, VR9, VR10
K 7	Adjust cursor position.		
K 8	Adjust cursor length.	Use J38074 reticle scale.	
K 9 VR	Adjust animated/still image level.	Use model eye provided.	VR9 DAGAIN VR10 DABIAS VR7 BACK
K 1 0	Not used.		
K 1 1	Not used.		
K 1 2	Not used.		

6 . Refractometer Test Item Description

① TEST - 00 : Displaying the chopper frequency and its variation, as well as R/L, FOG and AX sensor status information



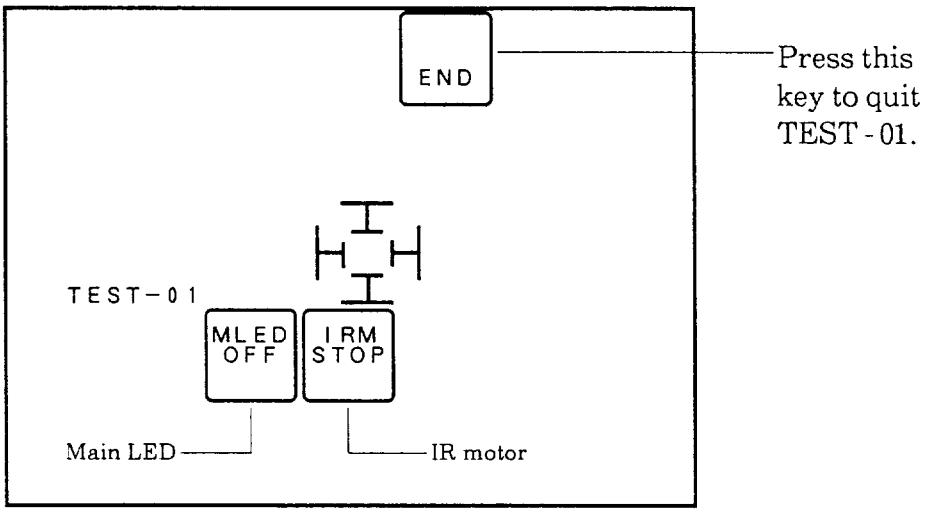
• Chopper frequency: CHOP=524.1 000.2

Chopper frequency variation

Chopper frequency: OK if 524.0 ± 1.0 is obtained.

• R/L, FOG and AX sensors
L O (Low) : The sensor light is cut by the sensor plate.
H I (High) : The sensor light is not cut by the sensor plate.

② TEST-01 : Turning on the main LED and rotating the IRM (image rotator motor) continuously



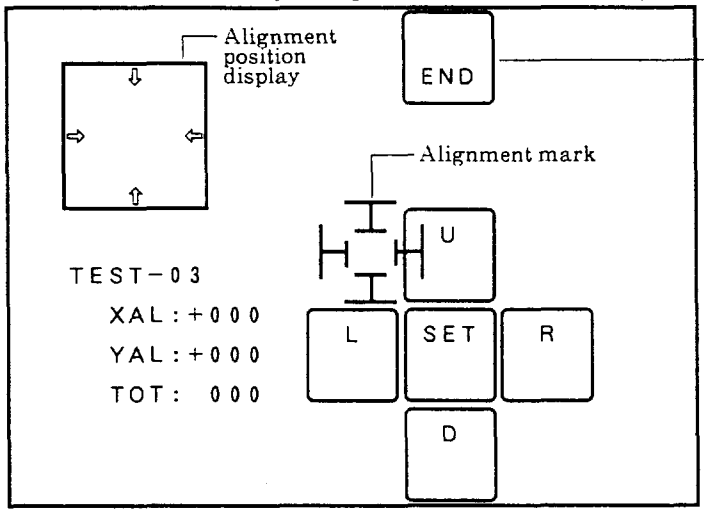
• Turning on the main LED (M. LED)
Press the [MLED OFF] key to change the display into [MLED ON], and the M. LED will turn on continuously. Press the [MLED ON] key again to change the display into [MLED OFF], and the M. LED will go off.
Keep the LED on for as short a time as possible because extended LED lighting will shorten the LED life.

• Continuous IRM rotation
Press the [IRM STOP] key to change the display into [IRM ROT], and the IR motor will rotate continuously. Press the [IRM ROT] key again to change the display into [IRM STOP], and the IR motor will stop.

* * * When a motor have been stopped and noised because of the depth of gearing, set the power to OFF once and start to rotate again.

* * * After turning on the M. LED and rotating the IR motor, make optical adjustments on the IR (image rotator), and check the accuracy of the rotation and the position of the photo detector unit.
Connect the oscilloscpe to TP18 (XAL) and TP17 (YAL).

③ TEST - 03 : Model eye alignment and adjusting the alignment mark position



• Adjusting the model eye position

Adjust the position of the model eye tool installed on the centering tool so that the following readings are obtained:

XAL = +000 YAL = +000

TOT = 094 approx. (OK if read - out is between 60 and 105)

Adjust the center position roughly while referring to the position of the asterisk "*" mark in the alignment position display located at the upper left corner.

(Set the focus point to the fifth graduation of the scale in the model eye attaching tool.)

Finally, install the dust - proof glass and adjust VR3 GAIN until TOT=083 reading is obtained.

• Adjusting the alignment mark position

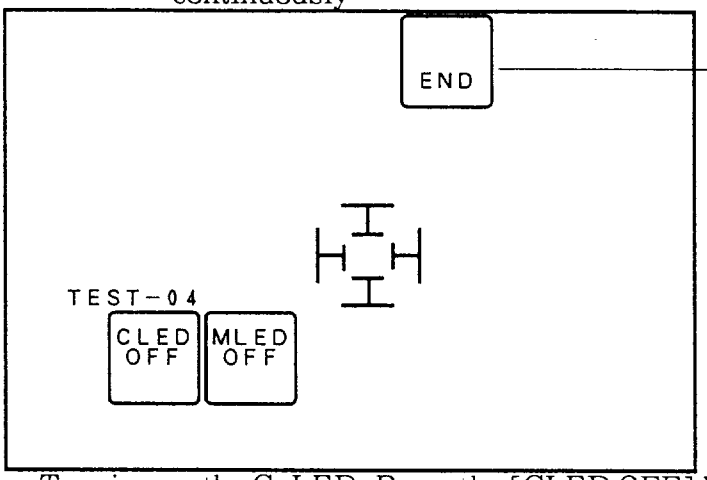
After adjusting the model eye position, do the following if the blinking dot of the M.LED is misaligned slightly from the alignment mark:

Move the alignment mark vertically with the [U] and [D] keys and horizontally with the [L] and [R] keys until the blinking dot of the M. LED falls at the center of the alignment mark.

After the adjustment is complete, turn DIP switch No. 5 located on the right side of the Main body to the ON position and press the [SET] key.

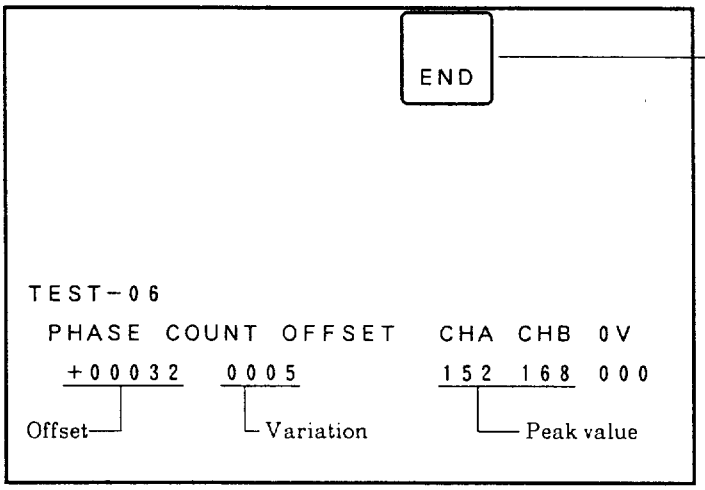
The alignment mark position is then stored in the EEPROM and the message "SET DIP SW5 TO OFF" is displayed. Return DIP switch No. 5 to the OFF position.

④ TEST - 04 : Turning on the C. LED (Calibration LED) and M. LED (Main LED) continuously



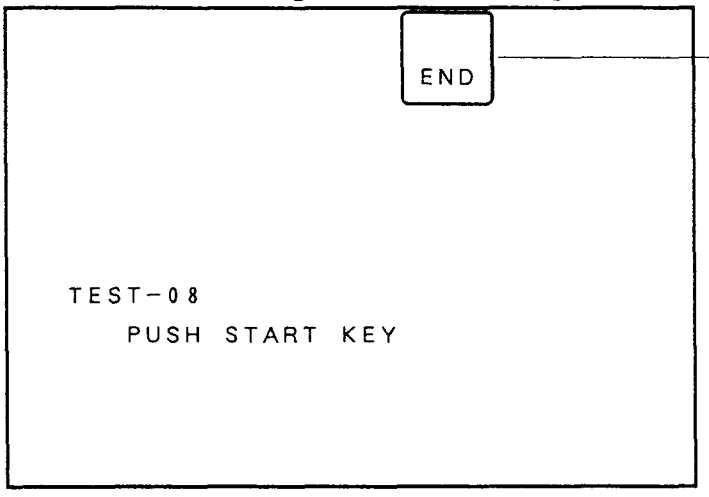
- Turning on the C. LED: Press the [CLED OFF] key to change the display into [CLED ON], and the C. LED will light up. This mode is used to check the CHA and CHB signals.
- Turning on the M. LED: Press the [MLED OFF] key to change the display into [MLED ON], and the M. LED will light up cotinuously. This mode is used to adjust the position of the M. LED.

⑤ TEST - 06 : Displaying the CHA and CHB phase count offsets and the CHA - FIL and CHB - FIL signal peak values



- Displaying the CHA and CHB phase count offsets
  This test displays the digital read - out of the phase difference offset after A/D conversion is made when the C. LED is on. Make sure that the following readings are observed:
  Offset: - 00200 to +00200 ; Variation: 0010 or less
- Displaying the CHA - FIL and CHB - FIL signal peak values
  This test displays the digital read - out of the peak values of the CHA - FIL and CHB - FIL signals after A/D conversion is made when the C. LED is on.
  CHA: 150 to 200 ; CHB: 150 to 200
  Adjust VR7 CAL until the reading of the CHA - FIL and CHB - FIL peak values falls between 150 to 200.
  (it is advisable that this adjustment be carried out during TEST - 0D)
- 0V display: Make sure that the level measured is 000. If read - out is not 000, the A/D converter is damaged.

⑥ TEST - 08 : Checking the monitor background color

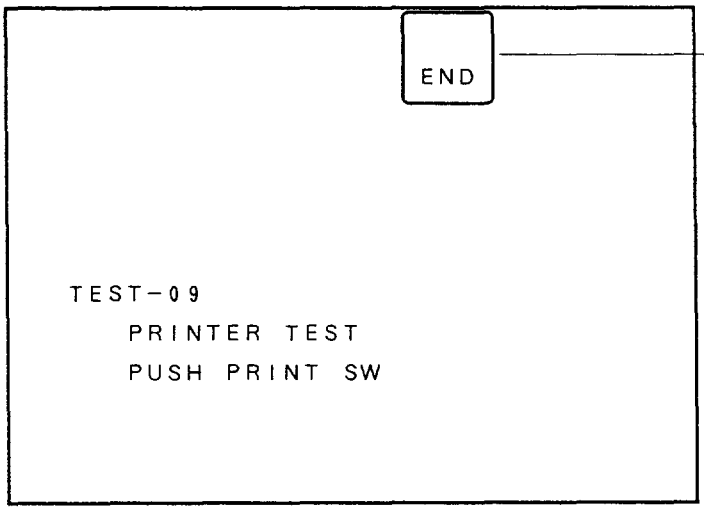


- The background color of the monitor should change on each press of the measurement button.

→ Transparent (video) → Black → White →

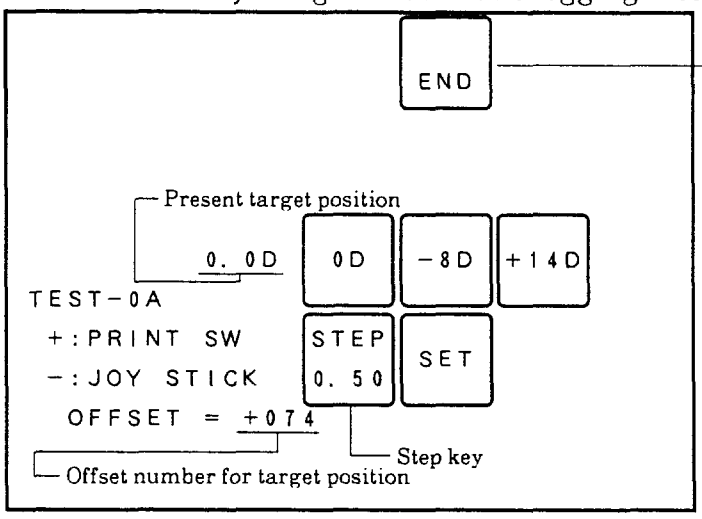
Transparent: Raw signal from the camera.
Black : The screen background is set to black by the black level signal.
White : The screen background is set to white by the white level signal (characters vanished in the background).

⑦ TEST - 09 : Testing the printer



- Press the [PRINT] key, and the NRK - 8000 will print 8 lines of data.
  This test is used to check the printer (e.g., for missing characters) and to check the print darkness.
  To adjust the print darkness, use the VR1 on the CPU board, and then turn the Main switch off and on to make the new setting valid.

⑧ TEST-0A : Adjusting the automatic fogging mechanism



• Positioning the automatic fogging target

Mount J39014 subjective inspection telescope and adjust the amount of offset to the 0.00Dpt. position of the fogging target.

While observing the fogging target with the J39014, move it with the [PRINT] key and measurement button (Joy stick) until the target position becomes clearly visible. Select the 0.12 Dpt. step with the [STEP] key and adjust the offset.

[PRINT] key : Moves the fogging target in the plus diopter direction.
Measurement button (Joy stick) : Moves the fogging target in the minus diopter direction.
[STEP] key : Adjust the increment by which the fogging target moves.

→ 0.50D → 0.25D → 0.12D →

The distance of the fogging target travel is the offset amount (number of pulses) and is displayed in the format "OFFSET = ***."

After establishing the offset, turn DIP switch No. 5 located on the right side of the Main body to the ON position and press the [SET] key. The offset amount is then stored in the EEPROM and the message "SET DIP SW5 TO FF" is displayed. Return the DIP switch No. 5 to the OFF position.

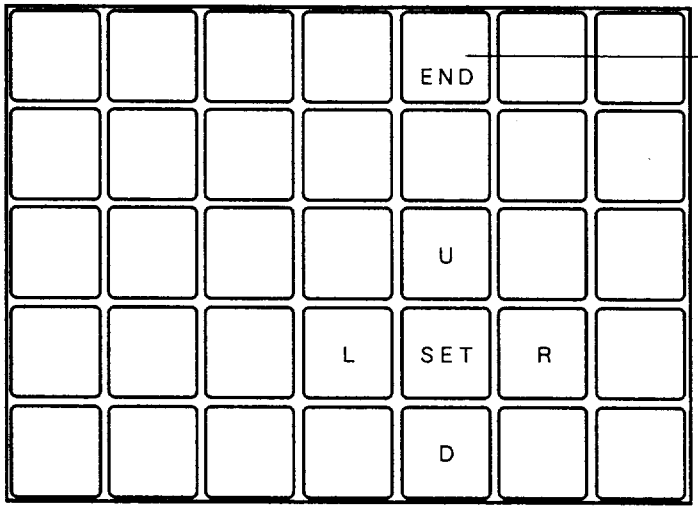
• Checking the fogging target movement

(the [PRINT] key and measurement button can not be used)

[-8D] key : Pressed to move the fogging target to the -8.00Dpt. position.

[+14D] key: Pressed to move the fogging target to the +14.00Dpt. position.

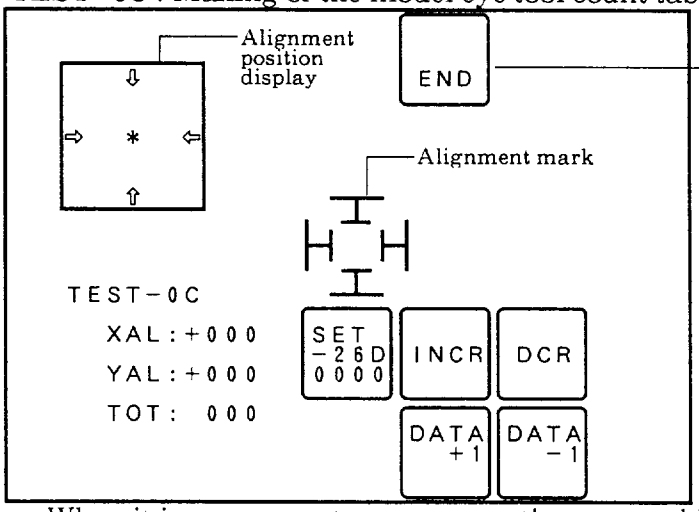
⑨ TEST - 0B : Adjusting the key display positions



Press this key to quit TEST - 0B.

- Adjust the discrepancy between the working area of the keys on the monitor touch panel and the key position displayed on the screen.
  [U] and [D] keys: Move the key display vertically.
  [L] and [R] keys: Move the key display horizontally.
  After adjusting the key display position, turn DIP switch No. 5 located on the right side of the Main body to the ON position and press the [SET] key. The offset amount is then stored in the EEPROM and the message "SET DIP SW5 TO OFF" is displayed. Return DIP switch No. 5 to the OFF position.

⑩ TEST - 0C : Making of the model eye tool count table



Press this key to quit TEST - 0C.

- When it is necessary to remeasure the count table data for the model eye after making optical adjustments on the auto refractometer unit, perform measurements on the model eye tool concerned and restore the new count table to memory (EEPROM).
- Selecting the model eye
  [INCR] key : Changes the power of the model eye tool displayed on the [SET] key by 2.00Dpt. to plus side.
  [DCR] key : Changes the power of the model eye tool displayed in the [SET] key by 2.00Dpt. to minus side.

The NRK - 8000 can show model eye tool power from - 26.00Dpt. to +26.00Dpt. in 2.00Dpt. step.

→ −26.00 ⟷ −24.00 ⟷ −22.00 ⟷ −20.00 ⟷ • • • • • • • 0.00 ←
→ +26.00 ⟷ +24.00 ⟷ +22.00 ⟷ +20.00 ⟷ • • • • • • • +2.00 ←

• Model eye alignment

Place the model eye tool of the selected power on the centering tool and align it.

Focusing : Adjust the focus by pushing or pulling the J35058 model eye attaching tool which installs the model eye.

Alignment: While observing the alignment mark, make a rough alignment of the model eye position by turning the centering knob of the centering tool until the asterisk * mark is positioned near the center of the display. Then make a fine alignment while observing the "XAL:" and "YAL:" displays to obtain "XAL: +0.00" and "YAL: +0.00" respectively. Make sure that "TOT: 094" or a similar value is also displayed.

• Measuring the model eye count

When you press the measurement button, the image rotator rotates and the count is automatically measured. The measured count is displayed in the [SET] key. Use the [DATA] key to change the displayed count or manually set the count.

[DATA +1] : Increments the counter by 1.

[DATA -1] : Decrements the counter by 1.

• Saving the model eye count

After establishing the count, turn DIP switch No. 5 located on the right side of the Main body to the ON position and press the [SET] key. The count is then stored in EEPROM and two short beeps are heards.

* Start counting at -26.00Dpt. After the storage of the count for -26.00Dpt. is complete, press the [INCR] key and select -24.00Dpt.
Then measure and store the count for -24.00Dpt.
Continue measurement sequentially up to the measurement of +26.00Dpt.. After storing all counts for measured model eyes, turn DIP switch No. 5 to the OFF position.

Press the [PRINT] key, and the count values stored in the EEPROM will be printed.

```
AX  OFFSET =  67
FOG OFFSET = +0074
     *** DP DATA ***
  DP      COUNT     DIFF.
-26D:     0000
                    +0050
-24D:     0050
                    +0020
-22D:     0070
                    +0030
-20D:     0100
        .
        .
        .
```

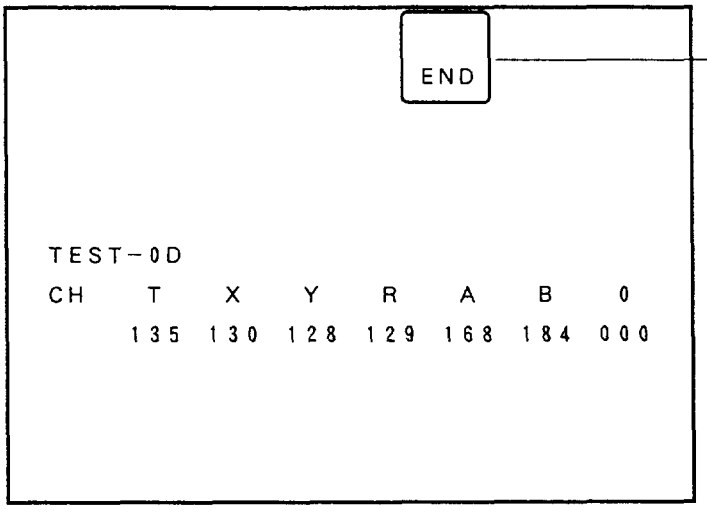
AX OFFSET = 67 — TEST-11 Cylindrical axis offset

FOG OFFSET = +0074 — TEST-0A Fogging target offset

-24D: 0050 — Count for -24.00Dpt.

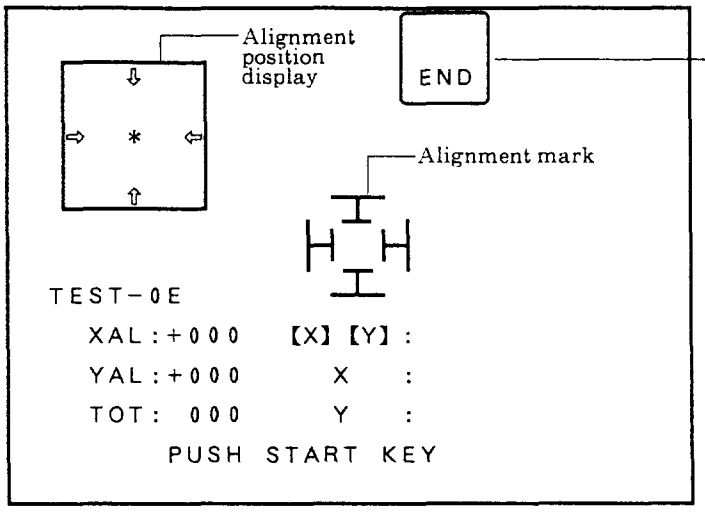
+0030 — Difference between counts for -22.00Dpt. and -20.00Dpt.

⑪ TEST - 0D : Alignment offset adjustment



- Adjusting the alignment signal offsets (with no room lamp)
  "T": Offset of the TOT signal caused by the amplifier system
  Adjust VR6 TOT to set " R ± 3 ".
  "X": Offset of the XAL signal caused by the amplifier system
  Adjust VR5 XAL to set " R ± 3 ".
  "Y": Offset of the YAL signal caused by the amplifier system
  Adjust VR4 YAL to set " R ± 3 ".
  "R": Reference voltage level for the alignment signal (2.5V)
  Make sure that the reference voltage is between 126 and 135 (not adjustable).
- Adjusting the peak value of CHA - FIL and CHB - FIL.
  "A": Peak value of the CHA - FIL signal when the C LED is on.
  Make sure that the peak value is between 150 and 200.
  "B": Peak value of the CHB - FIL signal when the C LED is on.
  Make sure that the peak value is between 150 and 200.
  * To adjust "A" and "B" use VR7 CAL to measure the peak values for both channels so that they fall within the permitted value range (same as in TEST - 06).
- 0V display
  "0": Make sure that "000" is displayed.

⑫ TEST - 0E : Checking the measuring optical system adjustment



- TEST - 0E can be used to test the accuracy of adjustments made on the measuring optical system (Image rotator and photo sensor)
- Model eye alignment

  Place the model eye tool on the centering tool and align it.

  Focusing : Adjust the focus by pushing or pulling the J35058 model eye attaching tool which installs the model eye.

  Alignment: While observing the alignment mark, make a rough alignment of the model eye position by turning the centering knob of the cenrering tool until the asterisk "*" mark is positioned near the center of the display.

  Then make a fine alignment while observing the "XAL:" and "YAL:" displays to obtain "XAL: +0.00" and "YAL: +0.00" respectively.

  Make sure that "TOT: 094" or a similar value is also displayed. If this value is not displayed, adjust the VR3 GAIN control.
- Measurement

  When you press the measurement button, the Image rotator rotates and measurement starts. The asterisk "*" mark in the alignment mark moves around and the "XAL:" and "YAL:" values change as the Image rotator rotates.
- Displaying the measurement results

  The NRK - 8000 displays the total of the alignment offsets measured at 72 measuring points at the 5 degrees steps.

  [X][Y]: Totals of alignment offsets in X and Y directions

  At checking : 50 or less

  At adjustment: Adjust so that the total will be 30 or less.

  X : Total of alignment offsets in X direction only

  Y : Total of alignment offsets in Y direction only

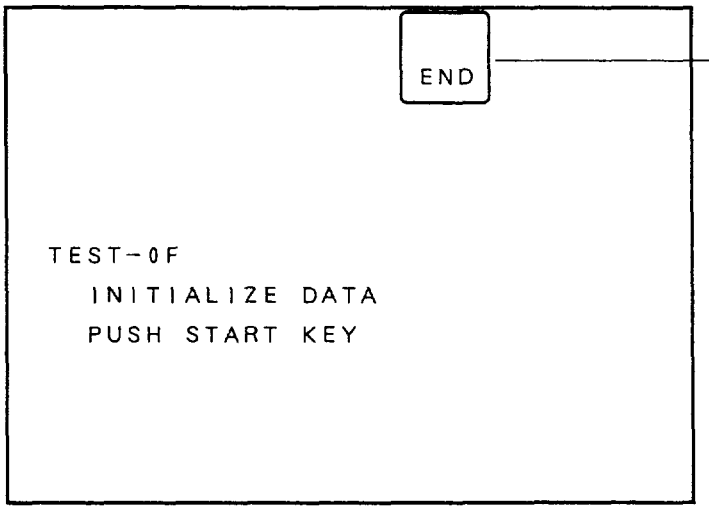
  * Calculation formula

$$[X]\ [Y] = \frac{1}{64} \sum_{i=1}^{72} \left(|Xi| + |Yi| \right)$$

$$X = \frac{1}{64} \sum_{i=1}^{72} Xi \quad \text{(Signed)}$$

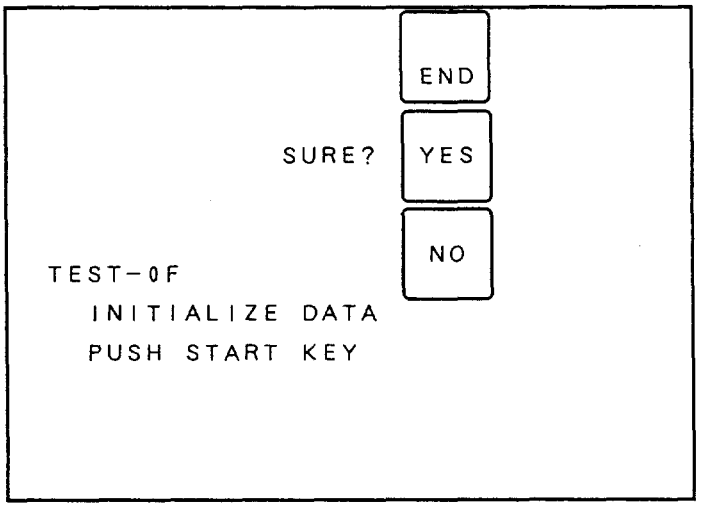
$$Y = \frac{1}{64} \sum_{i=1}^{72} Yi \quad \text{(Signed)}$$

⑬ TEST - 0F: Initializing memory (EEPROM)



- This test initializes the EEPROM that stores the model eye count tables and offset values by storing their system standard values. This test must always be conducted whenever the EEPROM is replaced with a new one.
  * Accidental execution of this test will overwrite all existing data with standard values, resulting in accuracy deterioration in any subsequent measurements.
- Initializing EEPROM

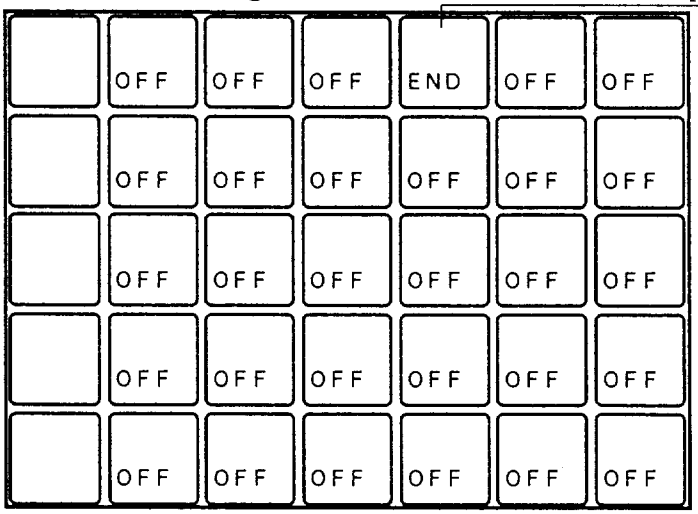
  Press the measurement button, and the confirmation screen will appear.



[YES] key : Press this key after setting DIP switch No. 5 on the right side of the main body to ON to start initializing the EEPROM.
When initialization is finished, "SET DIP SW5 TO OFF" is displayed.
Return DIP SW No.5 to the OFF position.

[NO] key : Press this key to cancel the initialization test.
The NRK - 8000 will then quit TEST - 0F.

⑭ TEST - 10: Making functional checks on the touch panel keys

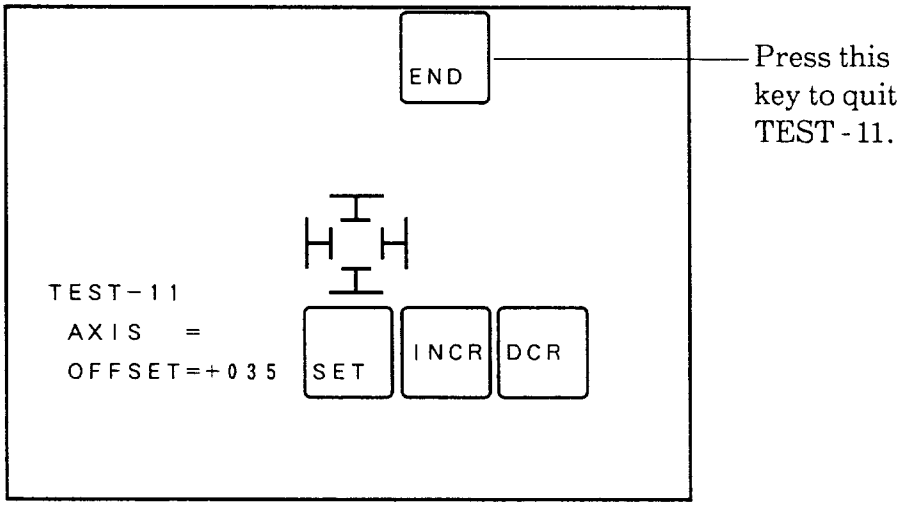


- This tests permits the user to check the touch panel keys for normal operation.
- Checking the key function

  Press the key to be checked. The key is normal if the corresponding display switches from OFF to ON. The END key is normal when the NRK - 8000 quits TEST - 10 normally.

  * TEST - 0B may also be executed in conjunction with this test to check the position of the key display frame.

⑮ TEST - 11: Adjusting the cylindrical axis offset



- Model eye alignment adjustment

  Place J38056 astigmatism model eye tool on the chin rest.

  Focusing : Focus the blinking dot of the M LED by sliding the Main body forwards or backwards.

  Positioning: Move the Main body by sliding and elevating until the blinking dot of the M LED is positioned at the center of the alignment mark.

  * Perform focusing and position alignment simultaneously. Before installing the astigmatism model eye tool, clean it with cleaner liquid.

- Measuring the cylindrical axis

  Press the measurement button to start measurement. The measured cylindrical axis is displayed in the "AXIS=" field.

• Adjusting the cylindrical axis

Using the [INCR] and [DCR] keys, adjust the cylindrical axis displayed in the "AXIS=" field matches the cylindrical axis value displayed on the mounting holder of J38056 astigmatism model eye tool.

[INCR] key: Increases the cylindrical axis by one. The value displayed in the "OFFSET=" field is also increased.

[DCR] key : Decreases the cylindrical axis by one. The value displayed in the "OFFSET=" field is also decreased.

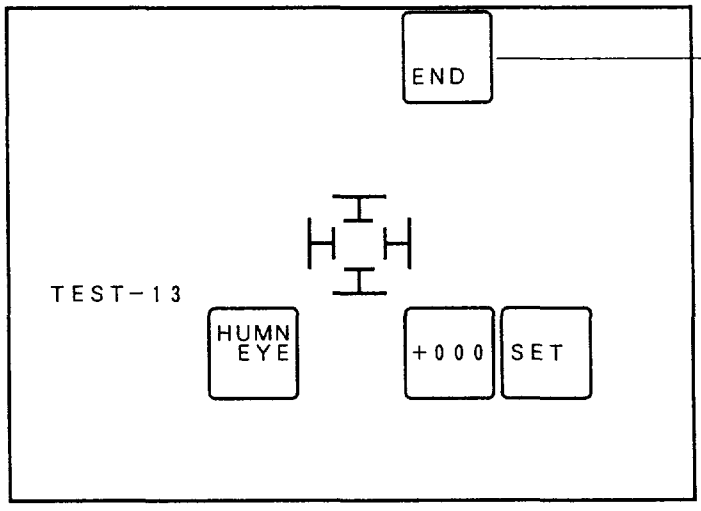
* * * Set a cylindrical axis sign to +C.

• Saving the offset value

When the offset value displayed in the "OFFSET=" field simultaneously during the cylindrical axis adjustment is established, set DIP switch No. 5 to ON and press the [SET] key.

The offset value will then be stored in the EEPROM and two short beeps will be generated. Then reset DIP switch No. 5 to OFF.

⑯ TEST - 13 : Selection of the model eye mode and human eye mode and parallel shifting of the spherical power



• Selection of the model eye mode and human eye mode

〔HUMN EYE〕 : Must be selected to measure the human eye and model eye provided with the instrument (normal measurement mode).

〔MODL EYE〕 : Must be selected to measure the model eye tools during measurement accuracy test.

Press the [End] key to return to the refractometer test program select screen and press the [EXIT] key to enter the normal measurement mode screen.

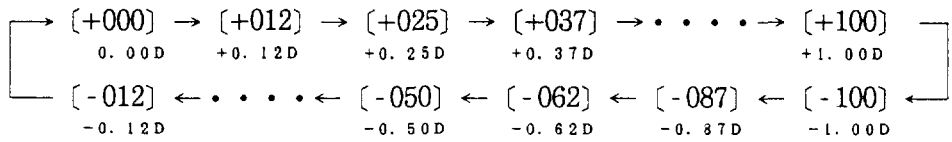
The "R/L" display on the normal measurement mode screen will turn to "M". Now you can measure the model eye tool accurately.

* After the model eye tool measurement is complete, turn the Main switch off and on to return to the normal human eye measurement mode.

• Parallel shifting of the spherical power

Use this test to shift the measured spherical power parallel.

[+000] key: Used to select the shifting amount. Each press of this key changes the power displayed on the keytop.

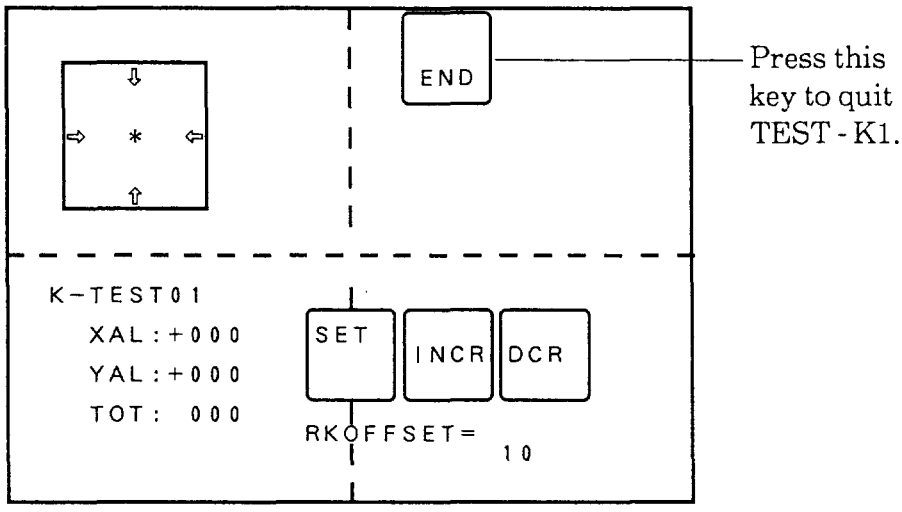


After establishing the shifting amount, turn DIP switch No. 5 located on the right side of the Main body to the ON position and press the [SET] key.

The amount of parallel shifting will then be stored in the EEPROM and two short beeps will be heard. Then return DIP switch No. 5 to the OFF position.

7 . Keratometer Test Item Description

① TEST - K1 : Correcting the refractometer and keratometer alignments



• Position adjustment

Mount J38074 auto - keratometer model eye tool set or the model eye tool using the J38075 centering tool depending upon the purpose of the adjustment.

Focusing : Adjust either by sliding the Main body or by moving the model eye forwards or backwards .

Position ing: While observing the alignment mark, adjust the position of the model eye tool by moving the NRK - 8000 by sliding or elevating or by manipulating the centering tool.

(In this case the data of XAL, YAL, TOT can not use for alignment.)

• Switching the mode

The NRK - 8000 alternates between the refractometer and keratometer modes each time you press the measurement button.

Refractometer mode: The magnification power is smaller and the entire model eye tool surface is visible.

Focus and adjust the alignment position at the center of the blinking dot of the M LED.

Keratometer mode : The magnification power is larger and the enlarged image of the lighting dot projected on the model eye tool surface is visible.

Focus and adjust the alignment position at the four LED lighting dot in the periphery.

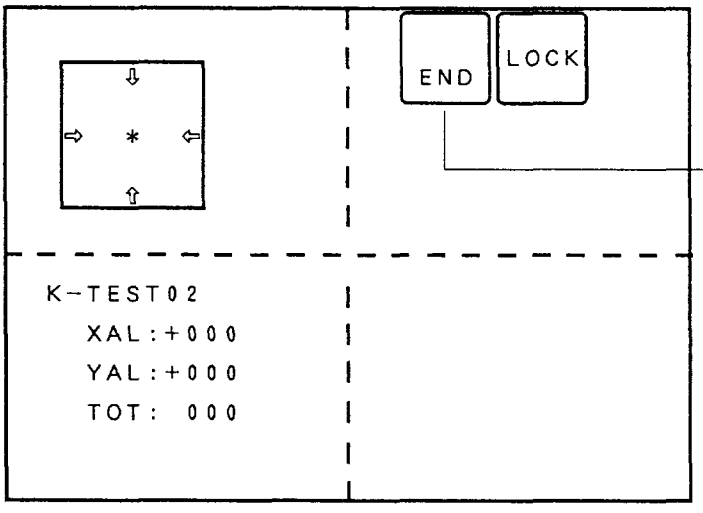
• Adjusting the switching lens sensor position
While observing the test signal at TP8 RKREF with a oscilloscope (digital voltmeter), adjust the position of the sensor for the refractometer - keratometer mode switching lens so that its output becomes stable (ground DG).

RKOFFSET=1 Low ⟶ 0.0V
RKOFFSET=2 High ⟶ Same as the voltage level (approximately 5 volts) at the left side leg of R26.

[INCR] key: Rotates the pulse motor counterclockwise. The displayed image moves downwards. The "RKOFFSET=" value increases.
[DCR] key: Rotates the pulse motor clockwise. The displayed image moves upwards. The "RKOFFSET=" value decreases.

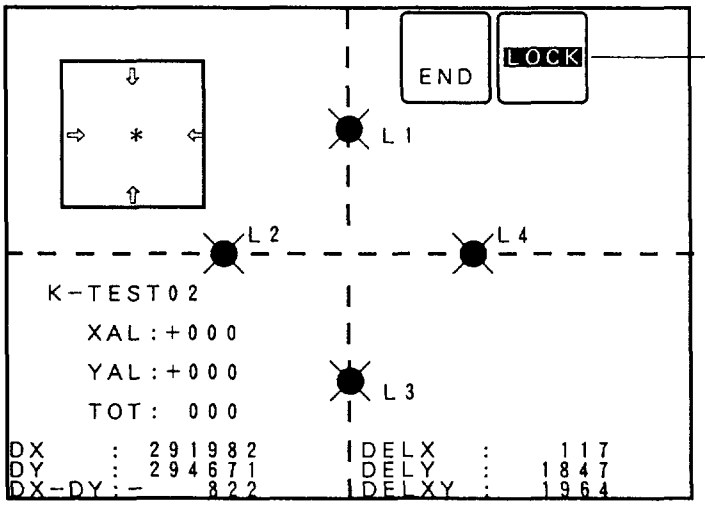
• Saving the "RKOFFSET=" value (pulse motor position offset)
After the offset is established, set DIP switch No. 5 to ON and press the [SET] key. Be sure to reset DIP switch No. 5 to OFF after saving the offset.

② TEST - K2 : Auxiliary refractometer and keratometer alignment corrections



Press this key to quit TEST - K2.

• Check the alignments of the refractometer system and keratometer system.
• The NRK - 8000 alternates between the refractometer and keratometer modes each time you press the [PRINT] key.



Kept excited while being displayed in reverse.

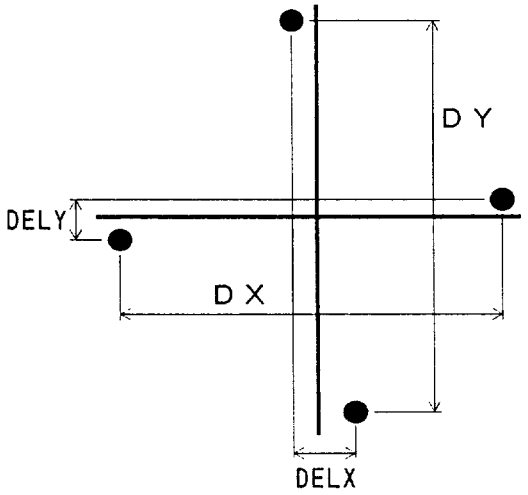
- Press the [LOCK] key and the switching lens pulse motor is excited and locked. At this point, you can make adjustments such as lens position.
- Displaying the keratometer measurement LED position data (reset the LOCK mode and enter the keratometer mode)

  Press the measurement button to display the screen positional data concerning the keratometer measurement light source LEDs.

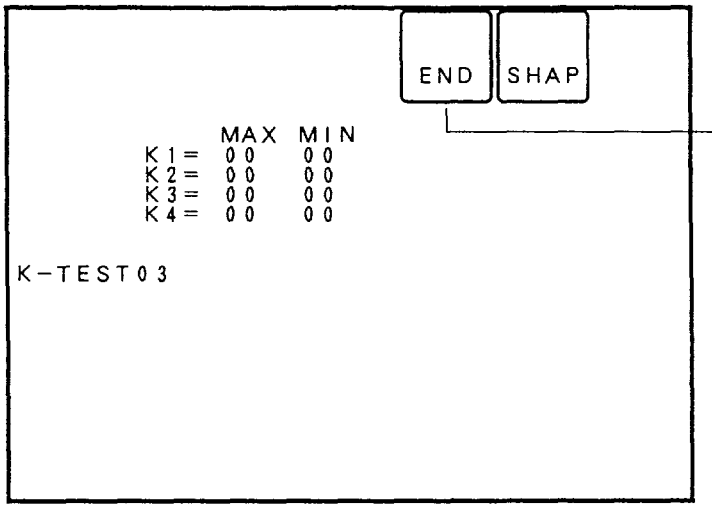
DX : 292982 ⟶ Displays the distance between L2 and L4.
DY : 294671 ⟶ Displays the distance between L1 and L3.
DX - DY: - 822 ⟶ Difference between DX and DY.
＊＊＊ DX - DY must be smaller than 10,000).

DELX : 117 → ΔX Horizontal offset between L1 and L3
DELY : 1847 → ΔY Vertical offset between L2 and L4
DELXY : 1964 → ΔXY Sum of ΔX and ΔY

＊ Adjust the position of the K1 - K4 keratometer measurement LEDs until the DX - DY: value is 10,000 or less.



③ TEST - K3 : Adjusting the intensity of keratometer measuring LED light.



• Position adjustment

Place J38074 auto - keratometer model eye tool set on the chin rest. Choose the TEST - K1 mode and align the four lighting dots for keratometer measurement with the R11 tool model eye in the keratometer mode.

Enter the TEST - K3 mode while keeping this alignment.

• Adjusting the intensity of LED light

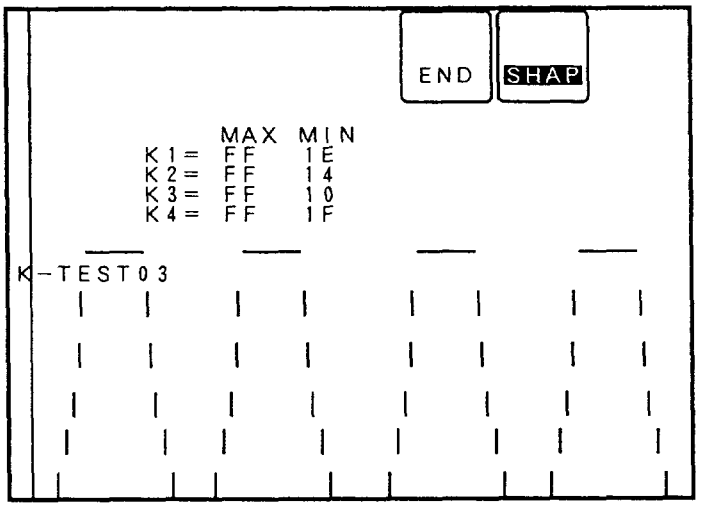
Set the intensity of LED light to its minimum by turning VR1 K1 through VR4 K4 fully counterclockwise.

Adjust VR5 ADGAIN and VR6 ADBIAS on the keratometer board so that the "MAX" reading of K1 through K4 becomes "FF" and the "MIN" reading of K1 through K4 becomes "1*.".

After adjusting VR5, adjust the "MIN" value with VR6 and the "MAX" value will change.

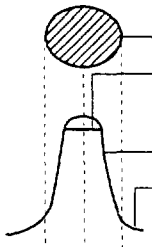
Adjust the "MAX" value again with VR5 and the "MIN" value will change.

By adjusting the two potentiometer alternately, make sure that K1 through K4 read "MAX FF" and "MIN 1*.".

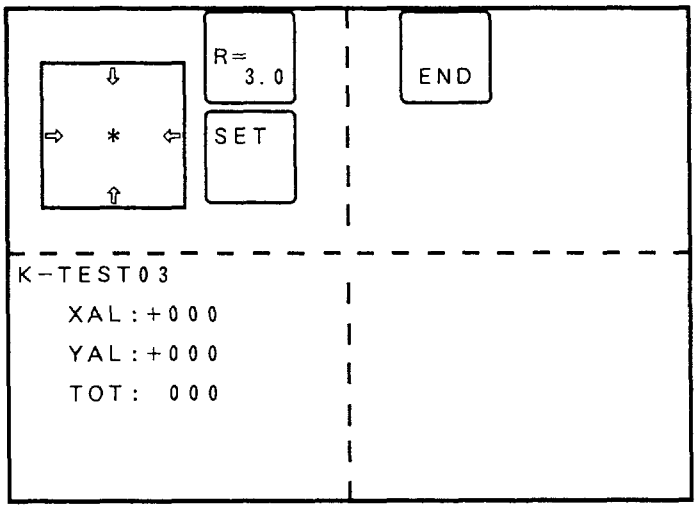


• Displaying the light intensity graph (changed by VR5 and VR6)

Press the [SHAP] key and the key is displayed in reverse video and a graph is displayed.



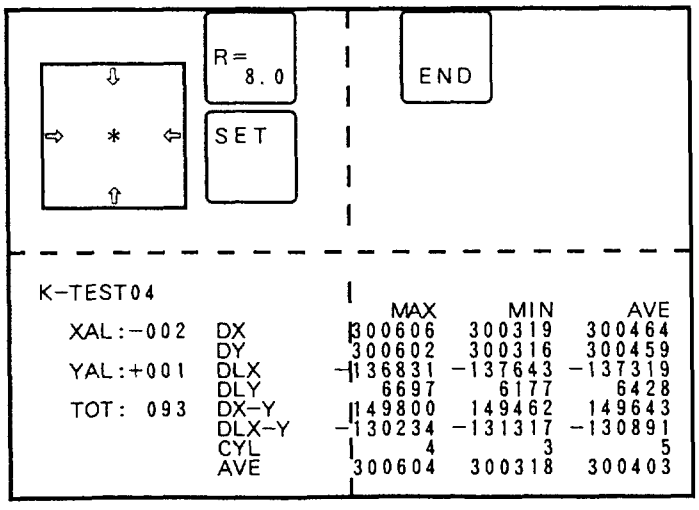
④ TEST - K4 : Makig of the keratometer model eye count table



- After carrying out an optical adjustment, measure the keratometer model eye counts again and create and store a count table in memory (EEPROM) (it is always necessary to rewrite the count data for all diopters of the model eye tool when an optical adjustment is made).
- Selecting the J38074 auto - keratometer model eye tool
  Select the R value (radius of curvature) of the model eye with the [R=] key.
  The selected R value will be displayed in the [R=] key.

  3.0 → 4.0 → 5.0 → 6.0 → 7.0 → 8.0 → 9.0 → 10.0 → 11.0 → 12.0 →

- Model eye alignment
  Align to the model eye tool of the selected R value.
  Focusing : Focus at the central M LED by sliding the NRK - 8000 forwards and backwards.
  Positioning: Move the NRK - 8000 by sliding and elevating so that the blinking dot of the M LED is positioned at the center.



• Measuring the model eye count

Press the measurement button and the measured model eye count will be displayed.

• Saving the model eye counts

After establishing the counts, slide the DIP switch No. 5 located on the right side of the Main body to the ON position and press the [SET] key.

The counts are then stored in the EEPROM and two short beeps are generated.

* Start counting at R3.0.

After the storage of the count for R3.0 is complet, press the [R=3.0] key and select [R=4.0] for measurement of R4.0. Measure sequentially all ten pieces of model eye tool up to R12.0.

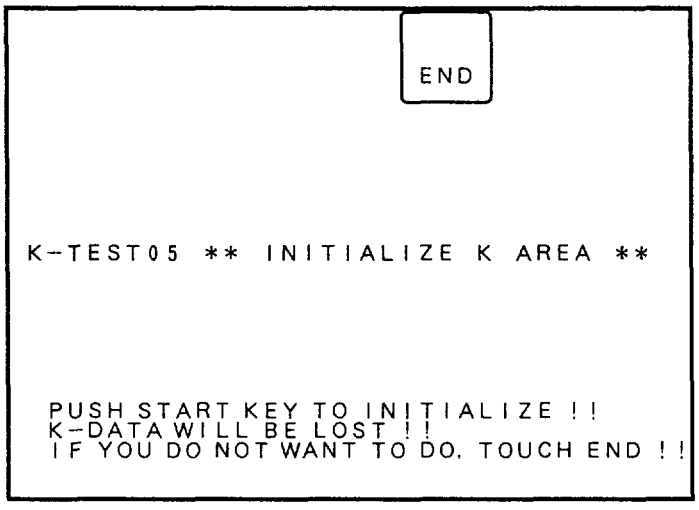
After measuring all model eyes, turn the DIP switch No. 5 to the OFF position.

* Reference count numbers

(Use these reference numbers to just find the model eye R number.)

R= 3.0 : 108...	R= 7.0 : 254...	R=11.0 : 399...
R= 4.0 : 145...	R= 8.0 : 288...	R=12.0 : 433...
R= 5.0 : 182...	R= 9.0 : 325...	
R= 6.0 : 217...	R=10.0 : 364...	

⑤ TEST - K5 : Clearing the keratometer correction values



• Clear the contents of the memory data whenever its EEPROM is replaced with a new one.

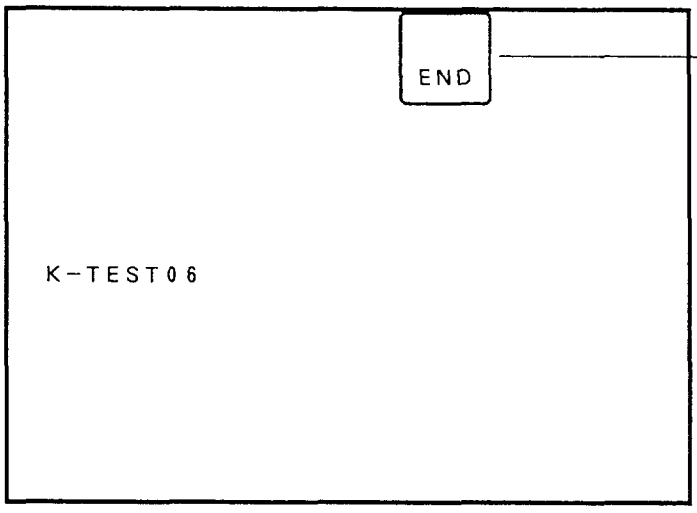
• Clearing procedure

Press the [K5] key in the keratometer test program select screen.

The message "SET DIP SW5 TO ON" will then appear on the screen. Slide DIP switch No. 5 located on the right side of the Main body to the ON position.

The message "SET DIP SW5 TO OFF" will appear when the data in the EEPROM is cleared. Return DIP switch No. 5 to the OFF position.

⑥ TEST - K6 : Presetting the potentiometers on the keratometer board



- When the keratometer board is replaced with a new one, preset the potentiometers on the new board using a oscilloscope.

  VR5 : ADGAIN VR6: ADBIAS
  VR8 : DAREF VR9: DAGAIN
  VR10 : DABIAS

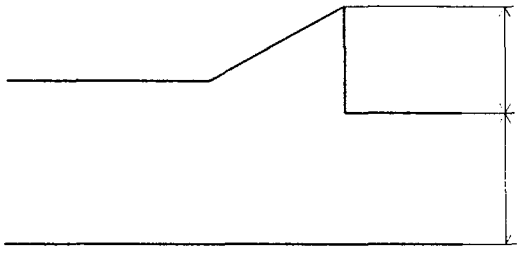
- Presetting VR8 DAREF

  Connect the probe of the oscilloscope to TP5 DAREF (Connect the ground probe to AG).

  Adjust VR8 until approximately 4 volts (3.976 volts) is obtained.

- Presetting VR9 DAGAIN and VR10 DABIAS

  Connect the probe of the oscilloscope to TP3 DAOUT (Connect the ground probe to AG).



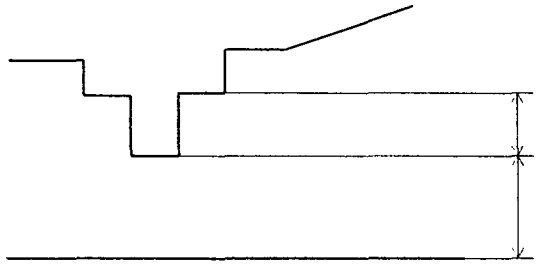
Adjust VR9 for 1.6 volts.

Adjust VR10 for 2.4 volts.

GND

- Presetting VR5 ADGAIN and VR6 ADBIAS

  Connect the probe of the oscilloscope to TP7 ADIN (Connect the ground probe to AG).

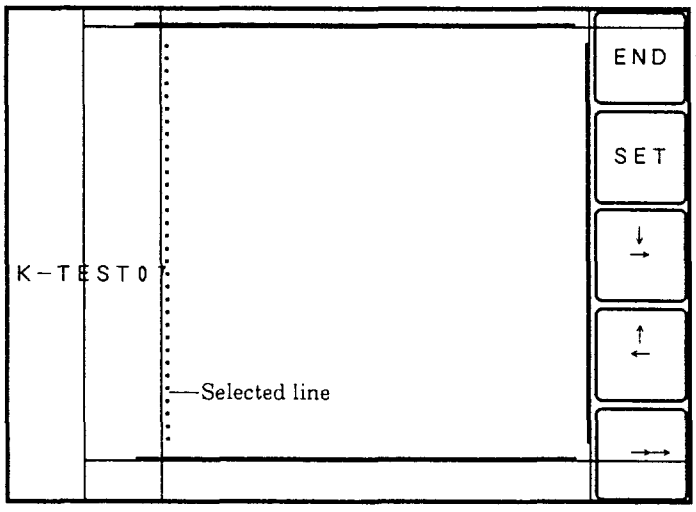


Adjust VR5 for 0.6 volts.

Adjust VR6 for 3.0 volts.

GND

⑦ TEST - K7 : Adjusting the cursor position



Press this key to quit TEST - K7.

- Align the cursor (character) with a still image (freeze image) line.
- How to use keys

  〔→→〕 : Each press of this key selects the new line to move.

  ┌→Left line →Right line →Top line →Bottom line ┐

  The line type of the selected line changes from solid to dashed.

  〔↓→〕 : When the left or right line (vertical line) is selected
  → The dashed line moves in the right direction.
  When the top or bottom line (horizontal line) is selected
  → The dashed line moves downwards.

  〔↑←〕 : When the left or right line (vertical line) is selected
  → The dashed line moves in the left direction.
  When the top or bottom line (horizontal line) is selected
  → The dashed line moves upwards.

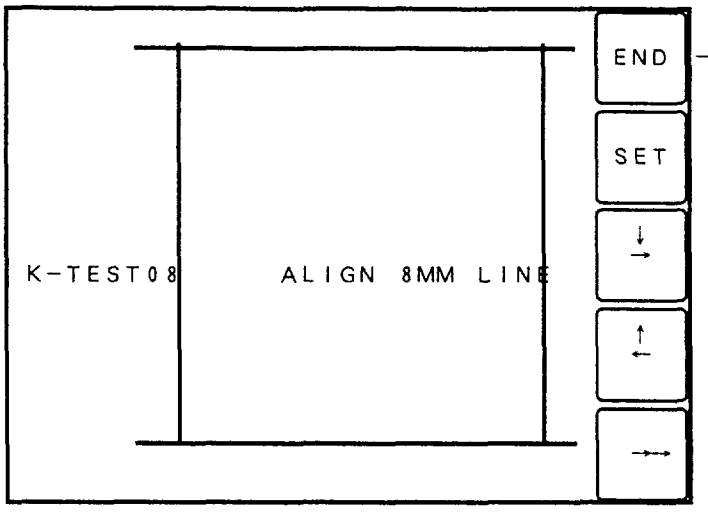
- Adjustment

  Move the dashed line until it overlaps the thin solid line.
  Lay the four (left, right, top, and bottom) lines over the nearby thin lines.

- Saving the positional data

  After establishing the position of the lines, turn DIP switch No. 5 located on the right side of the Main body to the ON position and press the [SET] key.
  The positional data is stored in the EEPROM. Be sure to return DIP switch No. 5 to the OFF position.

⑧ TEST - K8 : Adjusting the cursor length



Press this key to quit TEST - K8.

• Scale glass alignment

Align the scale glass of the J38074 auto - keratometer model eye tool set in the TEST - K1 keratometer mode.

Focusing : Slide the Main body forwards and backwards until the scale on the scale glass is clearly visible.

Alignment: Move the Main body by sliding and elevating so that the center of the scale glass is aligned with the center of the dashed lines displayed on the screen.

• Diameter adjustment

Choose TEST - K8 while taking care not to change the above alignment.

[→→] : Each press of this key selects the new line to move.

→Left line →Right line →Top line →Bottom line →

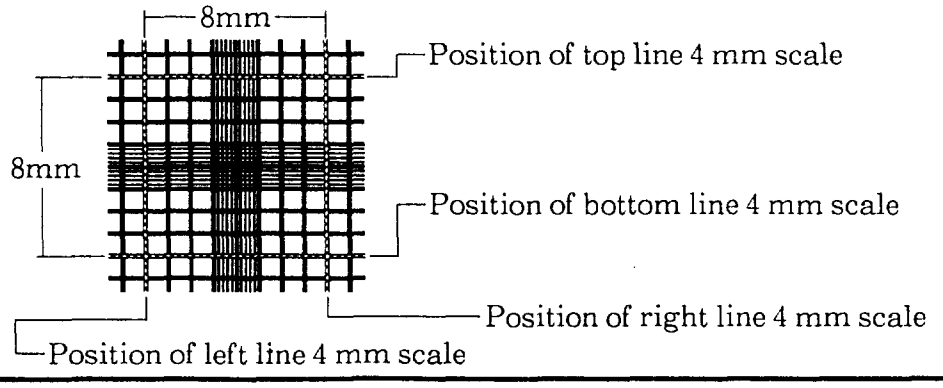
The line type of the selected line changes from solid to dashed.

[↓→] : When the left or right line (vertical line) is selected
→ The dashed line moves in the right direction.
When the top or bottom line (horizontal line) is selected
→ The dashed line moves downwards.

[↑←] : When the left or right line (vertical line) is selected
→ The dashed line moves in the left direction.
When the top or bottom line (horizontal line) is selected
→ The dashed line moves upwards.

Select the left line and move the dashed line with the [↓→] keys so that it lies over the 4 mm scale on the scale glass (4th 1 mm scale from the center).

Similarly, select the right, top and bottom lines, move the dashed line with the [↓→] or [↑←] key, and lay it over the 4 mm scale.

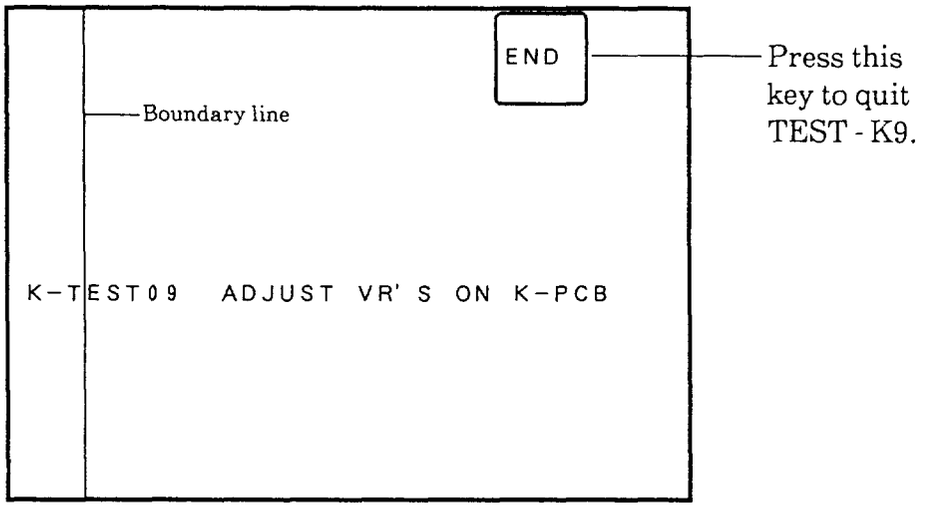

8mm
8mm
Position of top line 4 mm scale
Position of bottom line 4 mm scale
Position of right line 4 mm scale
Position of left line 4 mm scale

• Saving the positional data

After establishing the position of the lines, turn DIP switch No. 5 located on the right side of the Main body to the ON position and press the [SET] key.

The positional data is stored in the EEPROM. Be sure to return DIP switch No. 5 to the OFF position.

⑨ TEST - K9 : Adjusting the animated/still image level



• Model eye alignment

Place the J38074 auto - keratometer model eye tool on the chin rest and align with the scale glass at TEST - K1 keratometer mode.

• Reading the image

Press the measurement button and the video image is read as a still image.

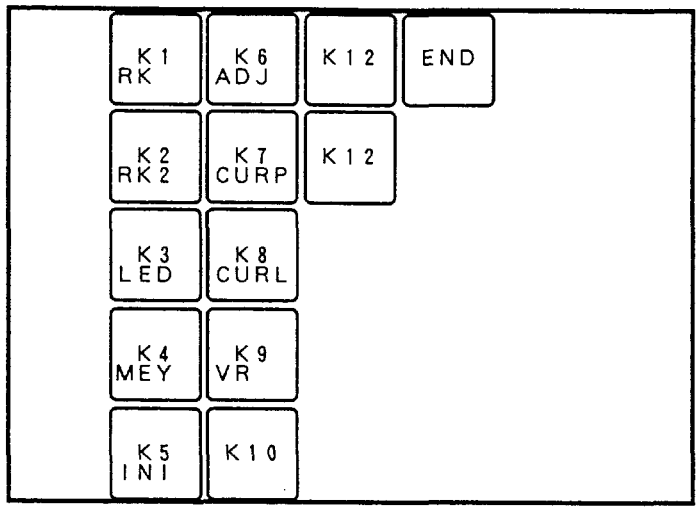
• Level adjustment

VR9 DAGAIN : Used to adjust the contrast.
VR10 DABIAS: Used to adjust the brightness.
VR7 BACK : Used to erase the boundary line.

Adjust the VR9 DGAIN and VR10 DABIAS potentiometer that the brightness of the two screen areas separated by the boundary line is the same.

Adjust the VR7 BACK control to ensure that the boundary line does not stand out.

8 . Printing the keratometer correction data



- Press the [PRINT] key in the keratometer test mode select screen and the NRK - 8000 will print the keratometer mode correction data.
  Use this function to examine the correction data when they happen to be overwritten by the default correction values after the NRK - 8000 is shipped.

```
   KERATO DATA PRINT
.....
RKOFFSET=  59 ———————— TEST - K1 (correction data + 50)
.....
IMG TABLE
    K(X,Y)G =    1714   2011 —— TEST - K7 and - K8 correction datas
    K(X,Y)  =     583    497
MUL(X,Y)G =-       1 -     1
MUL(X,Y)  =-    2200 -  1912
(X,Y)GSS  =      60     60
(X,Y) SS  =      68      7
(X,Y) E-S =     210    179
.....
.....
RAD-TABLE
.....
  R= 3.0 ———————————— TEST - K4 correction data
    113137   113103
        98      705
   -  150   -   251
.....
  R= 4.0
    151372   151475
        67      996
   -  347   -   376
.....
  R= 5.0
    200930   201389
```

〔7〕 PROTECT DATA SETTING

1 . Protect Data (Initialization Data)

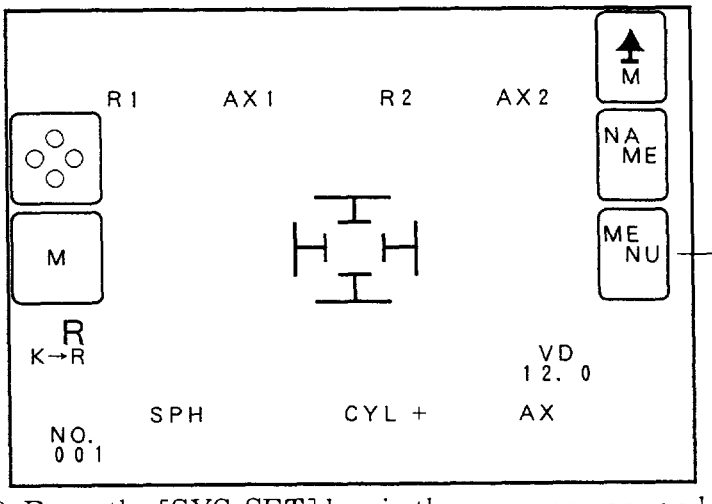
The NRK - 8000 stores essential operating data such as correction and initialization data in EEPROM. The data necessary for NRK - 8000 initialization is called protect data.

The protect data is divided into the following three types:

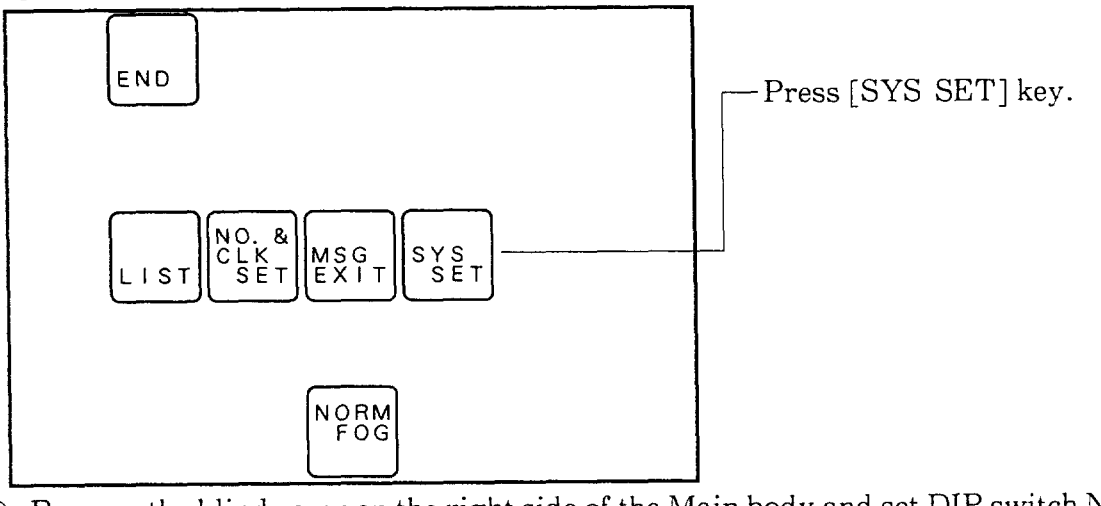
① External communication mode data
② Built - in IC card reader/writer mode data
③ Language data

2 . Setting up Protect Data

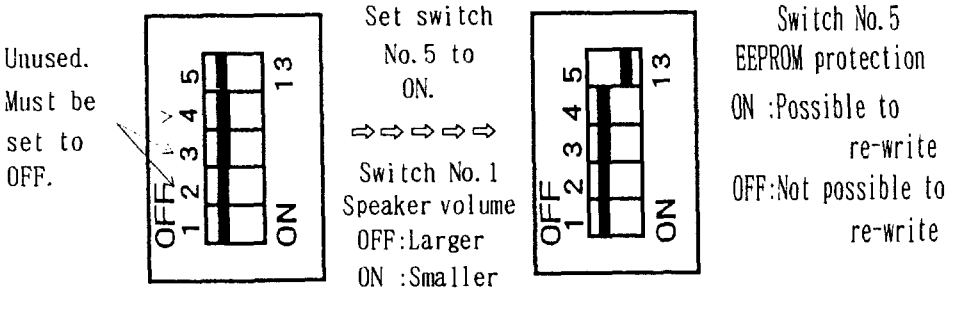
① Press the [MENU] key in the measurement mode to display the menu screen.



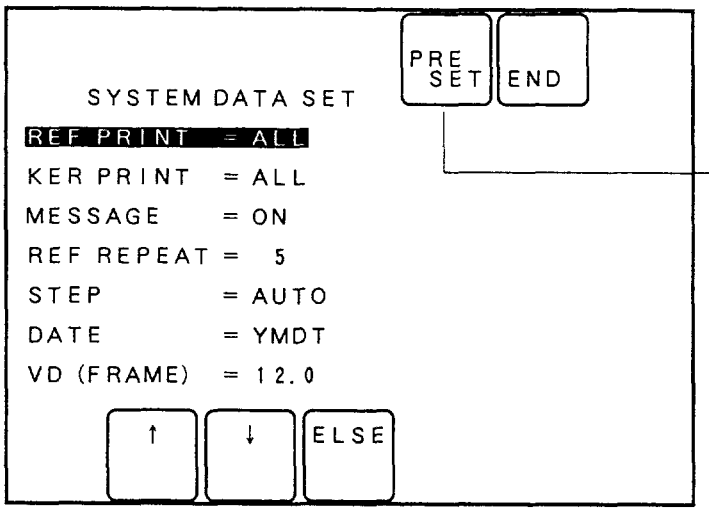
② Press the [SYS SET] key in the menu screen, and the system data setup screen will appear.



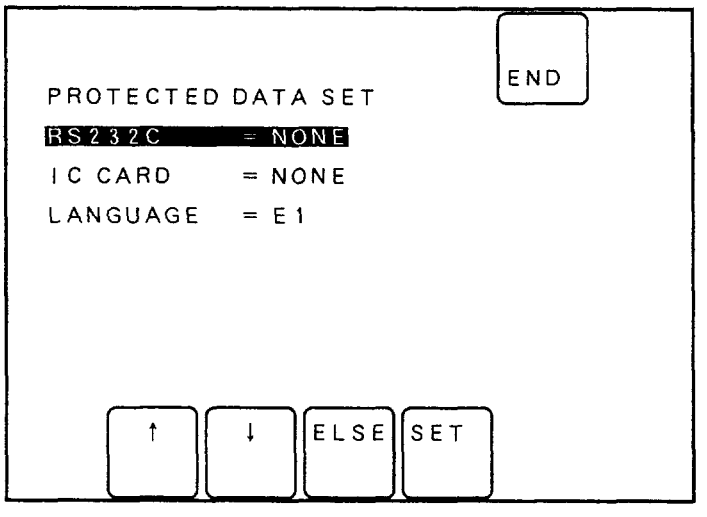
③ Remove the blind cover on the right side of the Main body and set DIP switch No. 5 to ON.



④ Find the [PRE SET] key displayed to the left of the [END] key in the system data setup menu.



⑤ Press the [PRE SET] key on the screen, and the protect data setup menu will appear.



Using the [↑] and [↓] keys, select the desired item and set the corresponding data with the [ELSE] key.

* Description of Protect dada

(1) RS - 232C : Setting up the external communication mode.
  =NONE : No communication (Select this when not connected)
  =NNKI : Transmit data in new NK mode on request from external device.
  =NNKE : Transmit data to external device in new NK mode on each end of measurement (triggered by "Print" switch).
  =NK : Transmit data in old NK mode (same as NR - 5000).

(2) IC CARD : Setting up the built - in IC card reader/writer
  =NONE : No IC card reader/writer is built - in.
  =NNK : Program data into IC card in new NK mode.
  =NK : Program data into IC card in old NK mode.

(3) LANGUAGE: Defining the language used

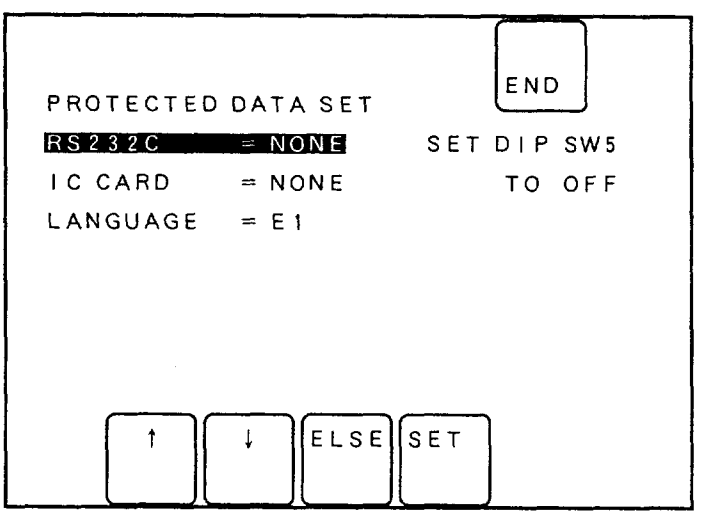
JP : Japan	E1: English	
E2 : English (with GR special charactor support)		
GR: German	FR: French	SP : Spanish
IT : Italian	SW: Swedish	DM: Denmark
TR: Turkey	NR: Norwegian	DU : Dutch
PR: Portuguese	HN: Hungarian	PL : Polish
IN : Indonesian	GK: Greek	

* : The system data setup screen options VD and DATE are not available when JP is selected.
  VD=12.0 DATE=YMDT are always set.
* : Special characters such as Ä and Ö are not supported in the E1 mode. Only genuine English characters are allowed.

* : Special characters such as Ä and Ö are allowed in ordinary English messages in the E2 mode.
* : The (language - specific) words that are displayed differently depending on the language selected include: SPH, CYL, AX, VD, PD, R, L and Title of Name(e.g., Mr.).

⑥ After setting up the above three items, press the [SET] key and the settings will be stored in EEPROM.

⑦ Set DIP switch No. 5 to OFF and press the [END] key to return to the measurement screen.



The message "SET DIP SW5 TO OFF" will be displayed if you press the [END] key without setting DIP switch No. 5 to OFF.
In this case, set DIP switch No. 5 to the OFF position so that the NRK - 8000 will return to the measurement screen mode.